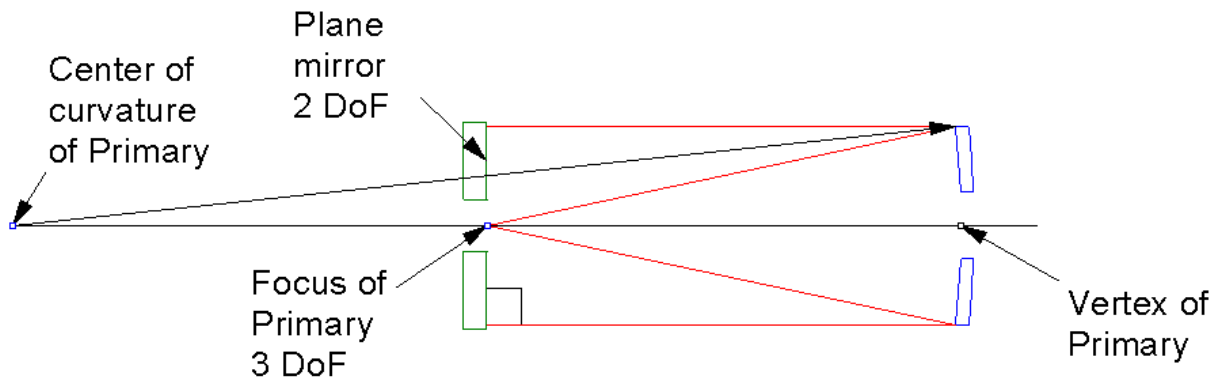


Aligning a parabola to an autocollimating plane mirror

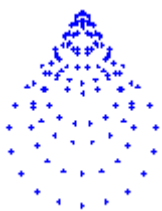
An autostigmatic microscope is a perfect way of aligning an autocollimating flat mirror to a parabola. The reason this alignment must be done is that a parabola only produces a perfect image of light from infinity when the light comes in parallel to the optical axis of the parabola. If the light is not parallel the image will be comatic, or have a tail that looks like a comet.

Since almost all symmetric parabolas have a central hole, we can make a test set up where we do not obscure any of the parabola aperture if the hole in the flat is smaller than that in the parabola. The test is set up as shown in the picture.



The red lines show how the center of curvature, the focus and the vertex of the parabola will all lie on a line that is the axis of the parabola when it is properly aligned. At the beginning of the alignment the light from the microscope will not come back anywhere near the microscope focus. The microscope is moved until the reflected spot of light comes back in the objective close to where it comes out.

At this point the return spot will be seen on the video monitor. The spot should be adjusted until it is centered on the screen, but it will be comatic lie the picture.



Now tilt the flat mirror in the direction of the axis of symmetry of the comatic image while keeping the spot centered on the screen by moving the microscope sideways. If you are moving the wrong way the image will get bigger and dimmer. In the right way, it will get smaller and brighter. Keep tilting the flat and moving the PSM until the spot collapses until a round spot. The shutter speed may have to be decreased because the spot will increase in intensity as the spot gets smaller.